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PROTAGROTIS OBSCURA BARNES AND McDUNNOUGH (LEPIDOPTERA: NOCTUIDAE): A PEST OF GRASSES GROWN FOR SEED IN THE PACIFIC NORTHWEST[1]

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Several species of cutworms and other Lepidoptera are sporadic pests of bluegrass and fine fescue grown for seed in eastern Oregon and Washington (Crawford and Harwood, 1964; Oetting, 1977). For years, Oregon grass seed producers in Union County were thought to have a serious pest problem with *Crymodes devastator* (Brace) (Noctuidae), based on larval determinations. In April 1976, many fields were badly damaged by larval feeding, and over 100 larvae were collected that appeared to be *C. devastator*. These larvae were reared to adults in the laboratory; 2% percent were *C. devastator,* and the remainder were *Protagrotis obscura* Barnes and McDunnough. Adult and larval voucher specimens of these *P. obscura* have been deposited in the collection of the U.S. National Museum, Washington, D.C.

A study of *P. obscura* was undertaken to determine the seasonal cycle, feeding damage, and certain aspects of its biology as a destructive pest of grasses grown for seed.

Materials and Methods

The phenology of adults was determined with two battery-powered blacklight traps operated in commercial fields of bluegrass grown for seed near La Grande, Oregon. Traps were operated 4 nights weekly during the moths' flight season. Specimens for taxonomic study were obtained from these light-trap collections or from larval specimens collected in the fields and reared in the laboratory. The seasonal occurrence of the larval population was determined by removal of cores of sod (20 cm diameter) at irregular intervals during the year. Larvae were extracted from the sod with Berlese funnels or removed by hand dissection of the sod. Some larvae removed from the field were reared to adults on fine fescue using methods described elsewhere (Kamm, 1970). The degree of parasitism and the sizes of head capsules were determined from these field collections. The sizes of the head capsules of larvae collected at different times during the season were determined by measuring across the widest portion of the head using a binocular microscope fitted with an ocular micrometer.

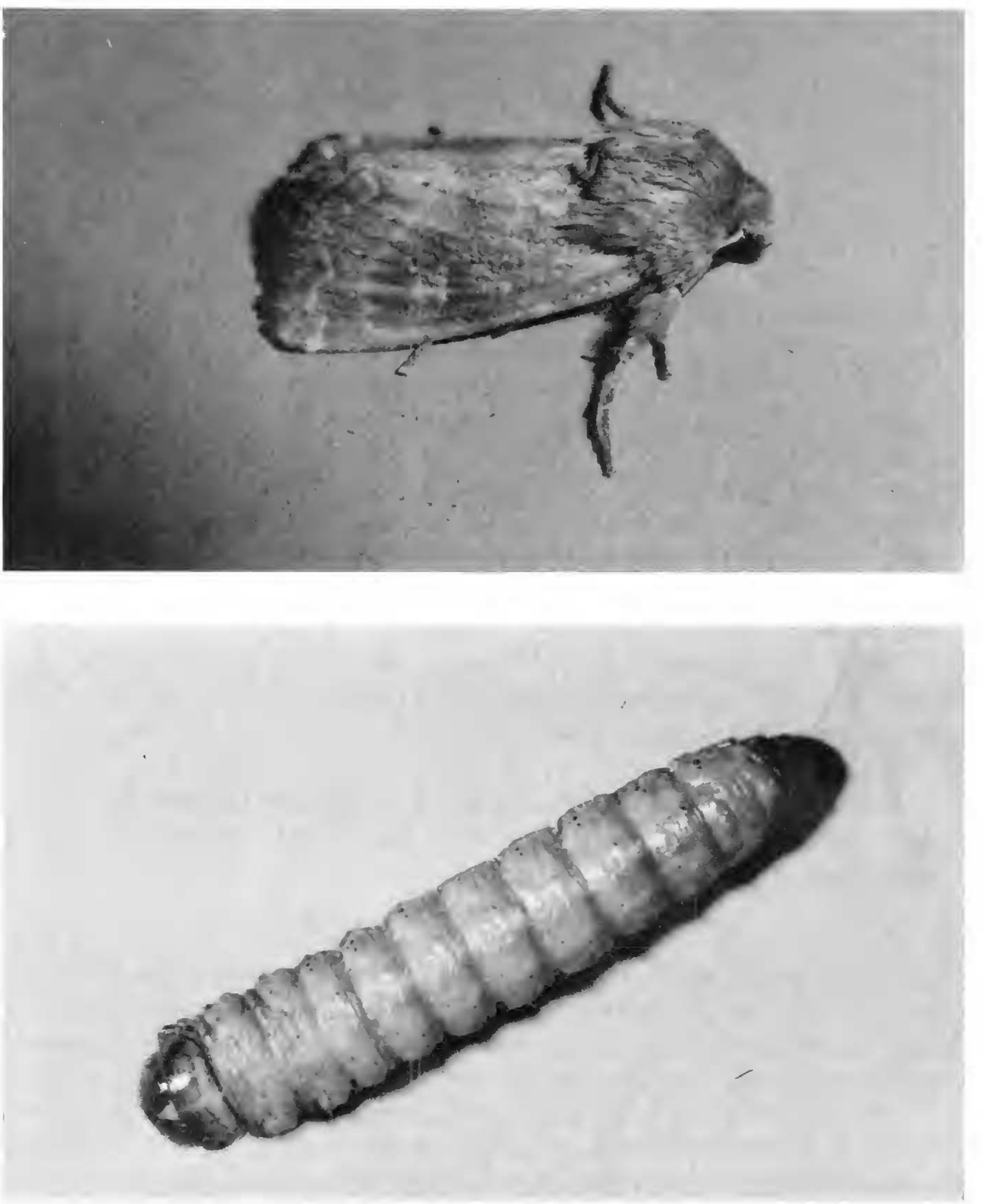

Fig. 1. Adult (top) and larva (bottom) of *P. obscura*.

Observations

Description of life states.—Adults are about 2 cm long (body length) and vary in color from reddish-brown to tan with tan markings on the wings (Fig. 1). Darker colored moths have conspicuous light-tan markings on each

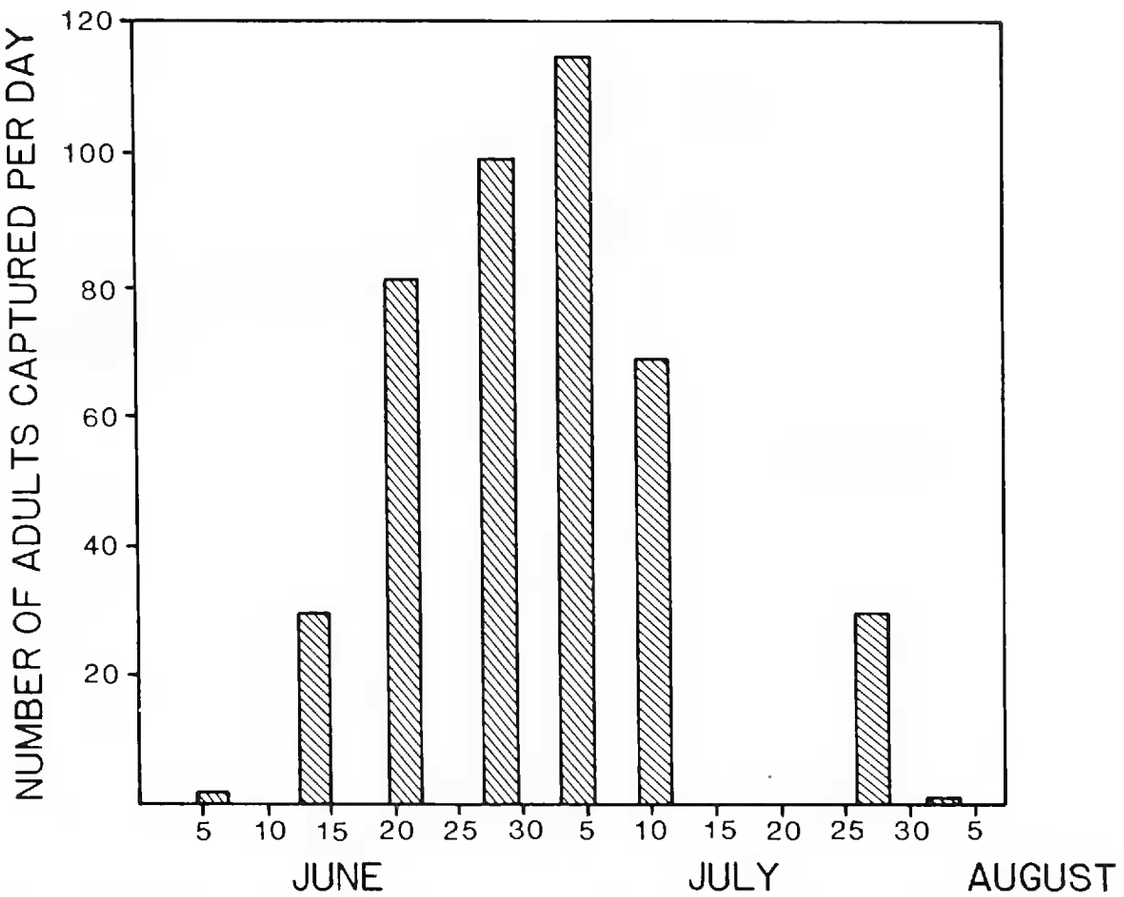

Fig. 2. Black light captures of adult *P. obscura* in commercial seed fields of bluegrass, La Grande, Oregon, 1979.

wing, which are difficult to discern on lighter-colored moths (Barnes and McDunnough, 1911). Eggs are cream colored, sculptured, and shaped like a pumpkin. They are 0.57 to 0.61 mm in horizontal diameter. Larvae are grayish-white and have a brown head capsule. Mature larvae are about 2.5 cm long (Fig. 1). Larvae of *P. obscura* and *C. devastator* are so similar in appearance that existing larval keys are not adequate to separate these species.

Distribution.—*P. obscura* was found in seed production areas surrounding La Grande in eastern Oregon and previously was reported in the Spokane area of eastern Washington (Crawford and Harwood, 1964). In 1978, I collected larvae from a commercial seed field of bluegrass near Rockford, Washington, and reared adults of *P. obscura,* thus, confirming the presence of the species in eastern Washington. To my knowledge, this insect has never been collected in western Oregon or Washington.

Seasonal history.—Adults began to emerge in June, and maximum numbers occurred in early July, based on light-trap captures (Fig. 2). Adult emergence in La Grande occurs close to the time of emergence in the Spokane area (Crawford and Harwood, 1964). The flight season of adults indicates that the species is univoltine. In general, the moths are nocturnal but

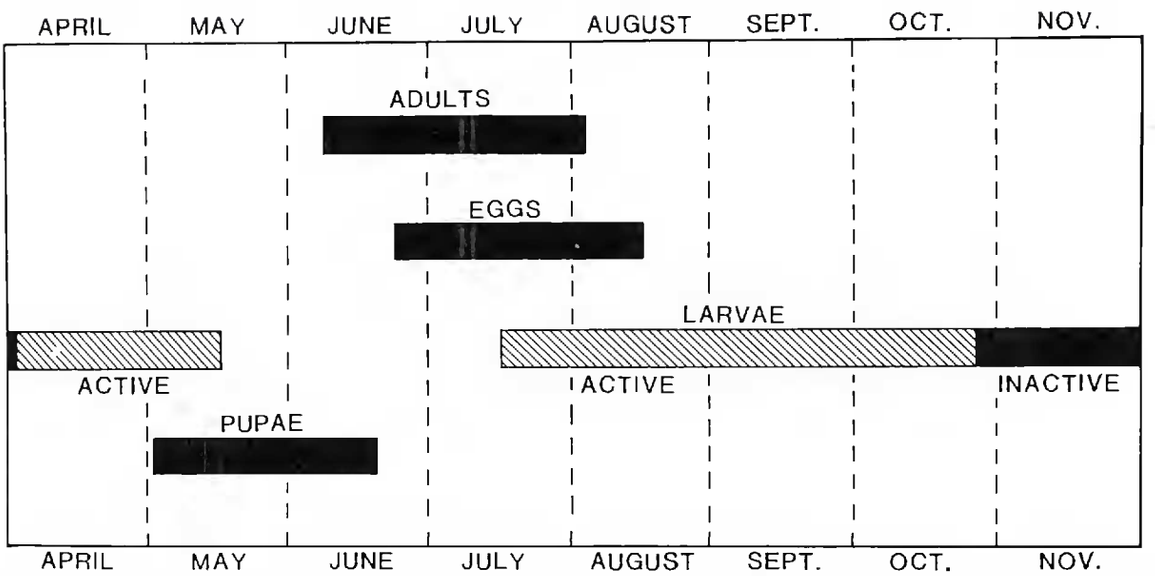

Fig. 3. Seasonal sequence of the life stages of *P. obscura* in commercial seed fields of bluegrass, La Grande, Oregon, 1979.

readily fly when disturbed during the day. They are capable of strong sustained flight. Females reared from larvae in the laboratory had immature ovaries the day of emergence and had a 6- to 7-day preoviposition period. The females were first to emerge in the laboratory and preceded the emergence of the first males by about the length of the preoviposition period. Eggs were deposited on leaves or within the leaf sheath of grass culms, usually in clusters. The eggs hatched in 9 to 10 days in the laboratory (21°C). In the field, the small larvae burrow into the plant crown where they actively feed until the onset of cold weather in October. Larvae overwinter in the plant crown but do not construct a hibernaculum. Feeding resumes in early April, and mature larvae begin to pupate in the crowns of grass during May. One lot of 205 larvae collected from the field on April 13 and reared in the laboratory required an average of 26 days to pupate (range 22–36) and remained in the pupal stage an average of 28 days (range 24–34). The seasonal occurrence of life stages is shown in Fig. 3.

Larvae collected from the field in October and reared in the laboratory were not in an intense diapause. Most larvae molted within 3 to 4 days and then resumed feeding. One lot of 28 larvae collected from the field on October 11 had a mean head capsule width of 1.7 mm (range 1.2 to 2.3). Another lot of 147 larvae collected from the field on April 15 had a mean head capsule width of 3.0 mm (range 2.2 to 3.9) and about one-half were actively feeding. The head capsule width of several full grown larvae averaged 4.3 mm. These observations and measurements demonstrate that larvae clearly resume feeding the following spring after wintering as partially grown larvae.

Host plants and feeding damage.—The presence of larvae in infested

fields is difficult to detect during July and August. Larval feeding damage becomes evident in September and October, when partially or entirely dead crowns appear in the field. Larvae are often found in the remaining green part of partially damaged crowns. In effect, the larvae sever the roots from the shoots in the crown, this being accompanied by an accumulation of frass. Larvae do not move about on the foliage or burrow into the soil, but remain in the crown as long as food is available there. When larval feeding results in the death of the plant, the larvae move to adjacent plants.

In general, feeding damage is most severe during October and April because the larvae are larger at these times. Limited larval feeding probably occurs from November to April during periods of warmer temperatures. The grass tillers that grow in late summer and early fall must be vernalized by winter temperatures to produce seed the following year. Destruction of these tillers, either in the fall or spring, will reduce seed yields. Dense infestations of larvae may also damage the stand to the point that the field must be reseeded. All varieties of bluegrass, fine fescue, and ryegrass grown in Union County proved susceptible to infestation of *P. obscura*. Heavily damaged grass fields are usually fall-plowed and reseeded to wheat. Most larvae survive the tillage, and the wheat seedlings are destroyed by larval feeding the following spring. Larvae have not been observed to complete their life cycle on wheat or damage established wheat fields.

Parasites.—The ichneumonid parasite *Lissonota clypeator montana* (Cresson) emerged from 6.3 percent of larvae of *P. obscura* collected from the field and reared in the laboratory. No other species of parasite was observed. In the Lissonotini (Banchinae), 8–12 species of *Lissonota* occur in the Pacific Northwest and parasitize a wide range of caterpillars (Krombein and Hurd, 1979). Among these, *Lissonota montana* (Cresson) is a known parasite of *C. devastator* and *Protagrotis obscura*.

Discussion

The biological observations presented here are the first reported for this univoltine cutworm *P. obscura,* a serious pest of grasses grown for seed. Larval infestations must be controlled to maintain stands of grass and keep fields productive. The lush regrowth that occurs when irrigation is resumed after harvest of seed probably favors survival of the pest species; otherwise the grasses remain dormant without irrigation until autumn rains.

There is the potential for rapid infestation of new seedings because adults are strong fliers and since females have a 6-day preoviposition period, they may go through an active dispersal phase before their ovaries mature and oviposition can begin (Johnson, 1969). The mobility of females is probably reduced once they become heavily laden with eggs and oviposition begins.

Infestations of *P. obscura, Chrysoteuchia topiaria* (Zeller) (Pyralidae: Crambinae) and *Chionodes psiloptera* (Barnes and Busck) (Gelechiidae) were

common in the same field. In fact, large numbers of *C. psiloptera* were encountered in fine fescue, a new host for this gelechiid. The larvae of this latter species are easily distinguished from the other two (Oetting, 1977). The feeding damage of *C. psiloptera* differs from that of *P. obscura* and *C. topiaria* in that larvae of the former sever individual tillers at the base of the plant but consume little of them. After these severed tillers desiccate and turn brown, the plant appears to be predominantly green with a few brown tillers scattered throughout the crown. Dense infestations eventually kill the plant, and the entire crown turns brown. Unlike *C. psiloptera,* damage by larvae of *P. obscura* and *C. topiaria* first appears as large dead spots in the crown, which gradually enlarges, killing the entire crown. Large dead areas appear throughout the field when larval populations are dense. Damage usually appears first on the high points or other well-drained areas in the field.

Acknowledgments

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Literature Cited

Barnes, W., and J. McDunnough. 1911. New species and genera of North American Lepidoptera. J. N.Y. Entomol. Soc., 19:153–154.

Crawford, C. S., and R. F. Harwood. 1964. Bionomics and control of insects affecting Washington grass seed fields. Wash. State Univ. Agric. Exp. Stn. Tech. Bull. 44, 25 pp.

Johnson, C. G. 1969. Migration and Dispersal of Insects by Flight. Methuen and Co. Ltd., London.

Kamm, J. A. 1970. Effects of photoperiod and temperature on *Crambus trisectus* and *Crambus leachellus cypridalis*. Ann. Entomol. Soc. Am., 63:412–416.

Krombein, K. V., and P. D. Hurd, Jr. 1979. Catalog of Hymenoptera in America north of Mexico. Smithsonian Institution Press, Washington, D.C., 1:1–1198.

Oetting, R. D. 1977. Immature stages and biology of *Chionodes psiloptera* a pest in bluegrass fields (Lepidoptera: Gelechiidae). Pan-Pac. Entomol., 53:258–263.

Footnotes

[1] Contribution of Agricultural Research, SEA, USDA, in Cooperation with the Agricultural Experiment Station, Oregon State University. Technical Paper No. 5536 of the latter.

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